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"Bands of masqueraders . . . assemble on the Queen's Park Savannah"

Carnival in Trinidad

by SIR LENNOX O'REILLY

IN two days Lent begins. For the past six weeks Port-of-Spain has been working up a tremendous emotional pressure, in preparation for these two days when it can really let off steam. Composers and singers of Trinidad's famous "calypsos" have been practising their latest variations of the traditional rhythm; old costumes have been furbished up, new ones pieced together with such material as is available and in any design that strikes the imagination.

And now it is six o'clock on the Monday

morning: "Jour Ouvert", and the Carnival opens. During Carnival Monday and Tuesday, bands of masqueraders, each led by its own 'steel band' orchestra (whose instruments consist mainly of pots and pans on which the 'musicians' thump vigorously), parade the city's streets and assemble on the Queen's Park Savannah and other open spaces. In former times only the poorer classes formed these bands; but during the past generation the extreme licence of what was once regarded as "the poor people's enjoyment" has become



Not all the spectators of the Carnival are intoxicated with the carnival spirit

moderated; all classes join in the fun; and committees of influential citizens award prizes for the most brightly and best dressed bands. Government turns a tolerant, if not a completely blind, eye upon the extravagances of some of the revellers; and the better-to-do celebrate the occasion with fancy-dress dances at the fashionable clubs.

Carnival, with its "farewell to the flesh", is of course mainly Roman Catholic in association; and although the population of Trinidad is mixed, about a third of the inhabitants being Hindus and Moslems of East Indian origin, a substantial number of the remainder are Roman Catholics. Many of those whose ancestors were Negro slaves inherit the religion of their former masters, descendants in the main of French Royalists who, after the Revolution, took refuge under other flags in the West Indies and until quite recently owned most of the plantations of the colony. French influence also accounts for the *lingua franca* which Trinidad shares with some of the other West Indian islands, a *patois* providing many phrases of current usage: for example, the names of two popular Carnival tunes—"J'u Vay" (Jour Ouvert) and "Em bas Caille

la" ("Under the House"). The word calypso itself is probably of French derivation; though exactly what it comes from is still disputed.

The calypso hits of the year are known as "Le'go's"—a name denoting the lack of inhibition which marks not only the Carnival (when people do indeed let go and few holds are barred) but also the calypsos themselves. For throughout the celebrations, especially in the evening when copious potations of rum have inspired the local Muse, the "chant-welles", as the calypso leaders have been called, loosen up on anyone whose characteristics take their fancy. They have kept the best of the new tunes up their sleeves, and in the calypso 'tents' which spring up in Port-of-Spain before the Carnival the professional calypsonians exercise their voices and their wits to the delight of hilarious audiences. Local politics and scandals; contemporary events; personalities popular and unpopular—all these come in for their share of witty comment and criticism. Many verses are improvised by the calypsonian while the accompanying musicians are repeating the chorus; especially when rival singers engage in "war" and expose each other's shortcomings for the amuse-



(Above) Arab influence in carnival fancy dress (Below) A band of American Negro masqueraders





Kodachromes by George M. Greenwell

"Pieced together with such material as is available and in any design that strikes the imagination"

ment of the crowd. The appointment of a new Governor invariably calls for a calypso like the one dedicated by the well-known calypsonian "Atilla" to Sir Bede Clifford:

At the Legislature just recently
He thrilled the entire community
When with great tact and diplomacy
He demonstrated his magnanimity.
The increments they gave him he immediately
Donated to deserving charity.
As much as to say he didn't agree
With Government's regrading of salary.

An excellent account of the calypsos, their origin and their present relationship to the Carnival, is given in a booklet by Charles

Espinete and Harry Pitts, published in Trinidad and entitled *Land of the Calypso*. I am indebted to the authors for the following description of the last hours on Shrove Tuesday evening. "Now, all restriction is gone with the wind. . . . Tomorrow is the day of retribution; of sackcloth and ashes. Tonight is—'Last Lap'. And so, from street to street, from house to house, the mad revelry continues until the gongs of Queen's Royal College clock sound the final hour—midnight—leaving thousands of tired, hoarse and intoxicated people, restored to saneness, stranded in the most uncomfortable places and distances away from home."

Masterpieces of Deccan Rock-Sculpture

by OSWALD COULDREY

The exhibition of Indian Art which is being held this winter at Burlington House does not include, since they are hardly capable of transportation, examples of the remarkable rock-sculptures described in the following article, though they represent an important stage in Indian artistic development

THE Ellora caves are cut in the scarp of a granite upland about 170 miles east-north-east of Bombay. The rather similar series at Ajanta lies about 40 miles farther in the same direction. The Ajanta caves are famous for their paintings; at Ellora the place of painting is almost entirely taken by no less remarkable sculpture. Some account of Ajanta was given in *The Geographical Magazine* for October 1937. At both places there are some thirty caves, wholly artificial and forming a nearly continuous line along the base of the rock face; but whereas the Ajanta caves are in a deep ravine, those at Ellora look westward over open country. The twelve southernmost caves at Ellora, like all at Ajanta, are Buddhist; but the next sixteen or so are Brahminical, and at the north end are a few highly ornate Jaina caves. For some reason unknown, the Ajanta cave-makers apparently stopped work suddenly in the 7th century A.D. and immediately resumed at Aurungabad, about 18 miles south-east of Ellora. At Ellora itself their first important work probably dates from the second half of the century, and must have lasted nearly a century. The Brahminical or Hindu caves look largely contemporary with these, but seem to have been continued longer. Along with the last of them the Jaina caves must belong to the late 8th century or later. Our dating has to be mainly guess-work as inscriptions are few and seldom helpful.

The Buddhist caves include a big Chaitya-hall or church, perhaps the last of a nearly millennial series of Indian rock churches. It follows the familiar plan except for a much less open frontal. The dwelling caves are more variously planned than the later Ajanta ones and have progressively fewer sleeping cells, thus leaning to the Hindu use, which was for a true cave-temple rather than a monastery. There are two very large three-storied Buddha caves (Nos. XI and XII) of which the second is especially impressive by reason of the austere and massive majesty of its granite halls and the serenity of its high

unhindered outlook over the western plain. The shrines of these 8th-century Buddhist fanes are populous with idols, but figure sculpture is on the whole neither so plentiful nor often so interesting in the Buddhist as in many of the Hindu caves. I think the Titan craft of rock sculpture proved less congenial to the gentle and humane spirit of Buddhism than it was to the more primitive and elemental imagination of unregenerate Hinduism. Only once at Ellora was I moved to the same degree of admiration before Buddhist idols as I often felt among their supplanters.

That was in No. VI. Here more than half the central hall and one of the balconied wings has fallen away, but the shrine at the back with its richly sculptured ante-chamber is almost as remarkably preserved as wrought. My first illustration figures the sentinel Bodhisattva on the south side of the shrine door. The two celestial sentinels which always in painted effigy flank the doors of the Buddha's shrines at Ajanta, do so as regularly at Ellora, but boldly sculptured now and almost in the round. On the Buddha's right the figure is always Avalokita, deputed Providence of the present age of the world. He is one of the five *dhyani* or spiritual Bodhisats, who are a sort of Archangel; but Maitreya, the subject of our illustration, is of human origin, and is destined to be born two thousand years from now as the next mortal Buddha; in his Brahminical crown of matted locks (for he will be born a Brahmin) he wears the sign of the stupa or memorial barrow 'against his burial'. Meanwhile he bides his time in the Heaven of Contentment, where every devout Buddhist who aspires not yet to the final bliss of Absorption prays to be reborn to wait on him. His image may be compared with its painted counterpart in Cave I at Ajanta, figured on page 42 of my Ajanta article mentioned above. The pillars in this cave are of the same richly carved jar-and-foilage pattern as appears in the Hindu cave next to be considered. This is one of the two types of pillar

oftenest found at Ellora, the other being the fluted shape named after Elephanta and figured twice on the last illustrated page of this article. Fergusson compares them respectively to the Corinthian and Ionic orders of the Greeks.

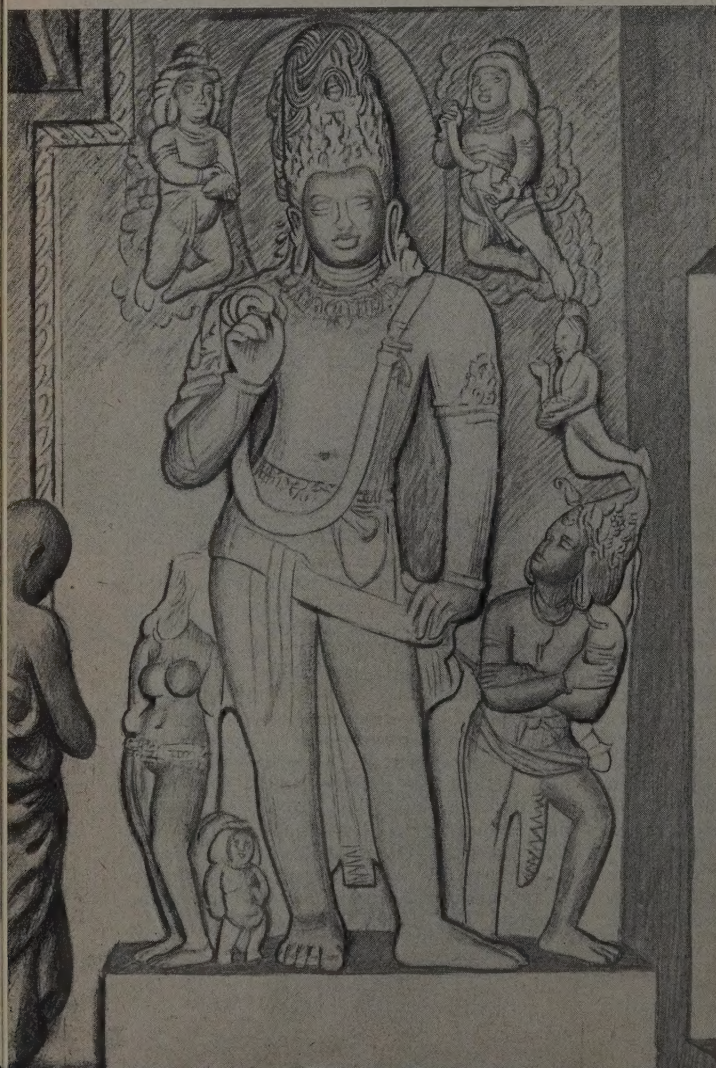
Proceed we now to the first in order (not in age) of the Hindu caves, commonly known as the Ashes of Ravana (No. XIV). My drawing shows part of the south wall seen from the square central space, which is clear of pillars like the garth of a cloister; the cave thus following the plan of a twelve-pillared Ajanta cave except in front, where an extra line of pillars takes the place of doored and windowed wall, and so leaves the hall much lighter. The walls are entirely covered with sculpture showing the

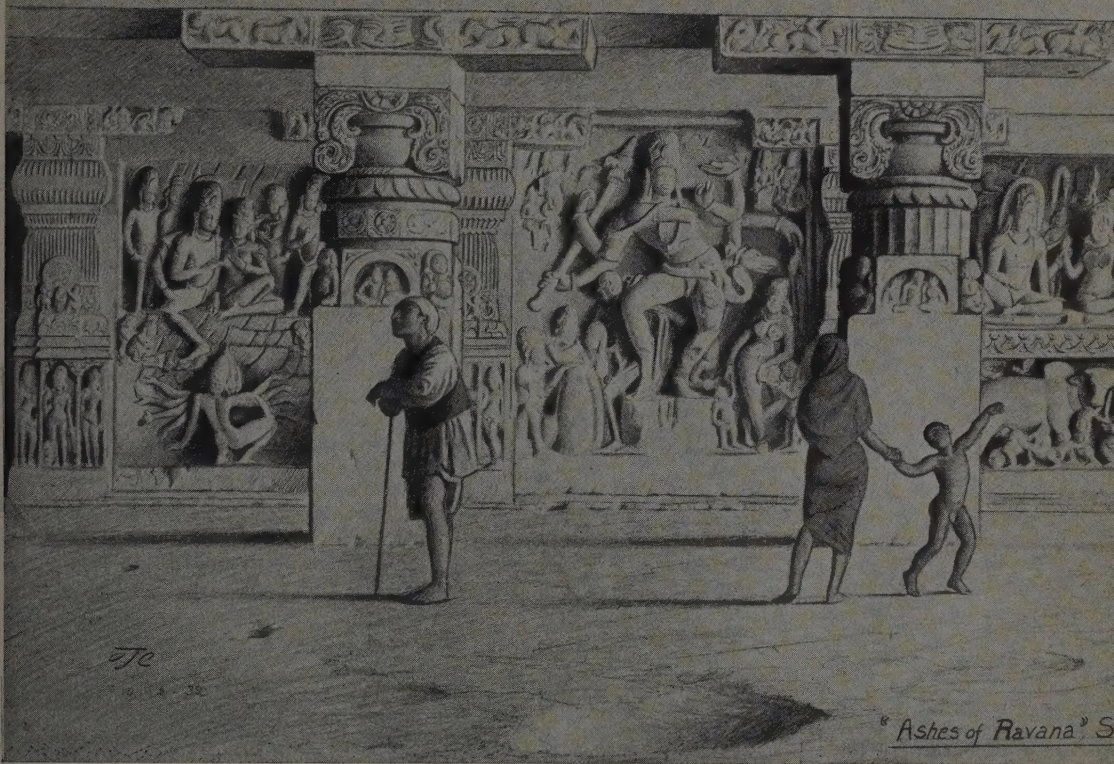
romance of Shiva and his bride Parvati, even as those at Ajanta are with paintings of Buddhist birth-stories. This plan is largely followed in the Hindu caves. The episodes represented are generally the same everywhere, like the stations of the cross in Christian churches. Three are shown in my drawing. On the right we see the divine couple at home, while below stairs the gnomes of the body-guard play tricks with Shiva's 'attribute' and familiar, the patient bull-god Nandi. They are thought to be profanely enacting the canonical picture of the Buddha's Flight from Home, in which the gods are always shown holding up the hoofs of the horse to prevent noise. On the left, Ravana, the ten-headed demon king of Lanka, labours to carry off the sacred Mount Kailas with its Lord and Lady

on it. The most convincing motive ascribed to him is that of securing an adequate ally against his destined enemy Rama, who is an avatar of the rival All-God Vishnu. The subject occurs regularly in Shiva's caves; why it should be chosen to name this one is not clear, nor why ashes are involved, as I never heard that Ravana was reduced to ashes like Kama (Eros) and other enemies of the Great God, but only that he had to endure a millennial term of imprisonment. The chief interest of this relief, fine as it is, lies in its relation to a much finer one, which we shall consider later.

The Bodhisattva Maitreya will be born some 2000 years hence as the next mortal Buddha. Meanwhile he waits in the Heaven of Contentment where devout Buddhists pray to be reborn to wait on him. This image is one of the door-wards of a Buddhist shrine at Ellora

All illustrations by the Author





"Ashes of Ravana" S

The walls of Cave XIV at Ellora are lined with bas-reliefs describing the romance of Shiva and Parvati. The cave is named after the relief on the left, which shows the demon Ravana trying to remove the god's paradisal mountain, a subject we shall meet again in the relief under the Kailas, on page 341. In the centre we see the Dance of Shiva, which sets the rhythm of the worlds in motion

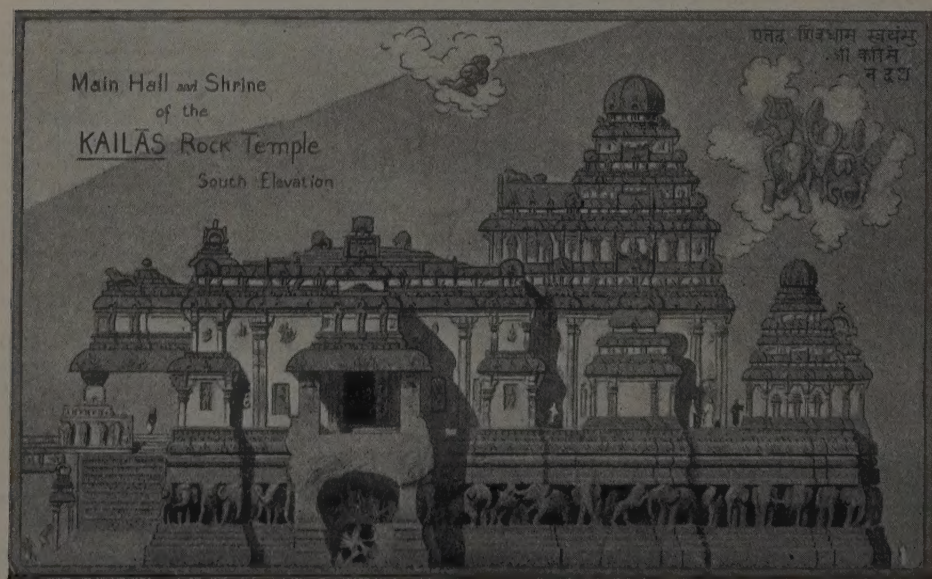
In the magnificent central group Shiva appears as the Universal Dancer. The texts enumerate several dances of the god, thus rather frittering away the sublimity of the main motive, which declares the rhythmic dance of all the worlds to be nothing but God's play and pastime. Who is the skeleton at the party? One or more of such grisly acolytes are usual in Shiva's train, and are variously read as Bhairava, a fearsome emanation of the god; as the time-demon Kal, who is Death; or as Kali, the dreadful goddess of Calcutta. A high authority calls this one Kali, but Kali is generally regarded as a grimmer mood of Parvati, who is here in her proper beauty with her son the baby war-god. Perhaps the identification was not yet fixed. The poet Kalidasa somewhere makes Parvati shudder at the gruesome Kali, and this Servant of Kali ought to know. That Shiva should be thus dreadfully attended reminds us that for all his lauded bene-

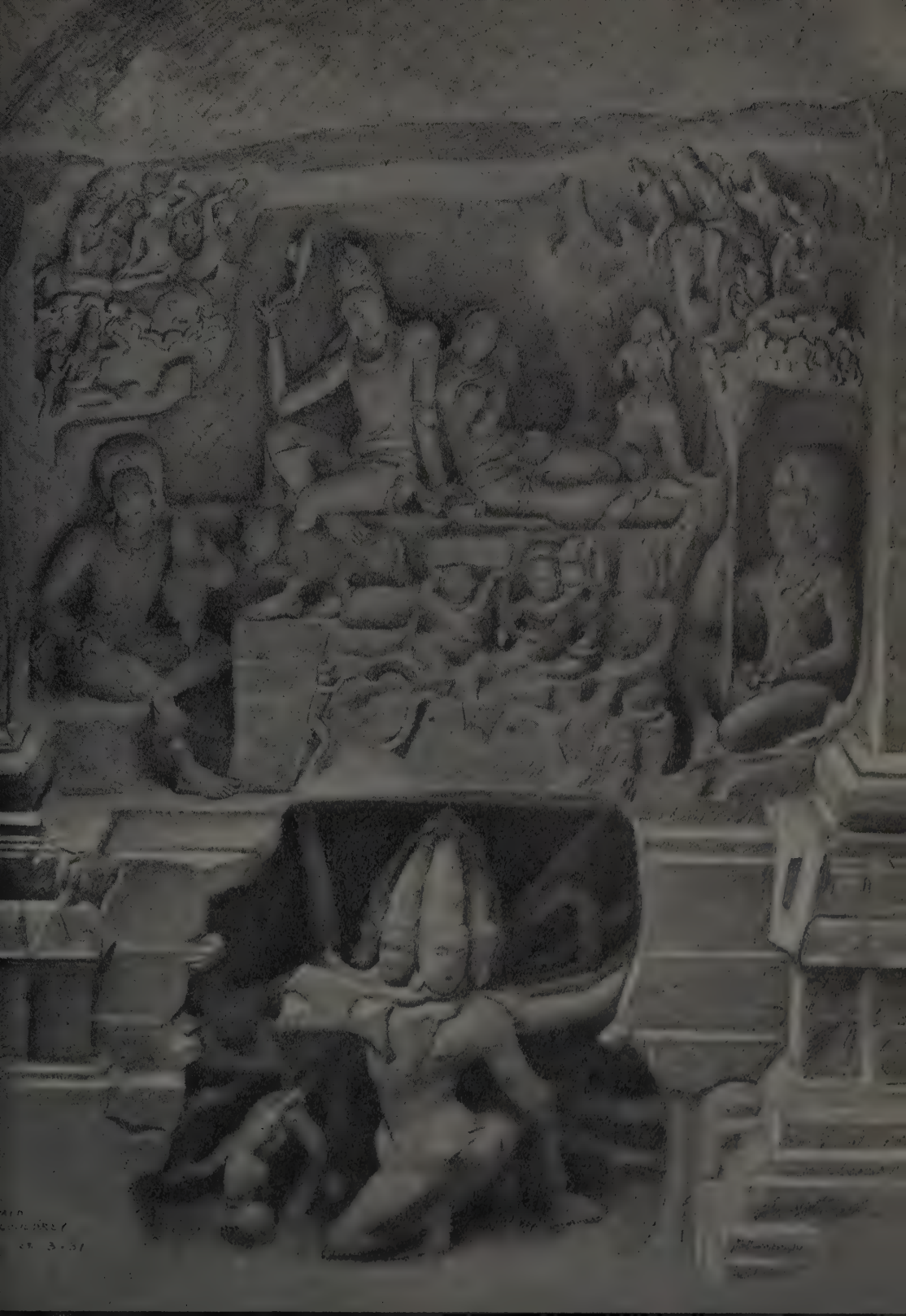
ficence he represents primarily the destructive aspect of the Hindu Trinity. His religion is essentially one of other-worldliness and renunciation. The Ellora caves are predominantly Shiva's; the shrine at the back of the hall generally holds the lingam or phallic emblem of the god, though in this instance a broken idol of the goddess takes its place. But the rivalry which now obtains between Shiva and Vishnu was at that epoch still deprecated by the orthodox, and in many of the Ellora caves the Avatars or Descents of Vishnu balance the gospel of Shiva on the opposite wall.

The next cave to this, though equally Shiva's, is even called nowadays after its Ten Avatars. The Das Avatara has the only historically helpful inscription at Ellora. The Rashtrakuta king Dantidurga, who tore Deccan suzerainty from the Chalukyas about A.D. 750, boasts of camping in it. He does not say that he made it, and I infer that it was his enemy's, and all its considerable pre-



The Kailas, chief temple of Ellora. (Above) The forecourt. On the left, the entrance; centre, the Nandi shrine; right, west porch of the temple. Behind rises the granite hillside from which the whole group was carved. (Below) The scale of various features compared in elevation. Under the south porch is the Ravana relief shown opposite and described in detail in the text of the article.







(Above) *The Lankeswara temple, a later adjunct of the Kailas, cut in the north wall of the court. The weight of the superincumbent mountain is emphasized by low roof and thick, closely set pillars. This fine cave is one of the last to be constructed at Ellora. Perhaps rather earlier is (opposite) Sita's Bath (otherwise called the Demur Lena), largest of the Ellora rock halls, which is formally a close copy of the famous Cave of the Triune Shiva at Elephanta near Bombay (opposite, below)*

decessors likewise. The Chalukyas made three fine caves at their southern capital Badami as early as about A.D. 600. The earliest is dated to a year, which we call A.D. 589.

Next in order and age is the Kailas, crowning glory of Ellora and one of the wonders of the world. It is not a cave but a Titanic feat of sculpture, of which the subject is a temple. The result is one of the largest and grandest temples in India, and one of the loveliest anywhere. It stands in a deep rectangular well 276 feet long and about 154 across, of which the sheer cliff wall at the inner end rises 107 feet to the sloping surface of the hill. The top of the sanctuary tower is 11 feet lower, the maximum height of rock allowed by the slope at that point. The main temple is joined by a bridge to the double-storeyed shrine of the bull-god Nandi before it, and this again to the gatehouse at the entrance to the court; the total effect being that of a temple almost longer than the court itself. In the walls of the court are many galleries, shrines, and halls of several storeys; so that from these, from the court, and from the hill-

side above, the temple can be seen from every angle and examined in every detail, like a casket held in the hand; the green parrots and the temple-haunting doves have no advantage of us in this respect. The Kailas is supposed to have been undertaken by Dantidurga's successor, Krishna I, to commemorate his defeat of the Chalukyas. It is in many ways a close copy of the principal Chalukyan temple at Pattadakal near Badami, but is raised to nearly twice the height on a basement of solid element surrounded by a magnificently realistic regiment of elephants as large as life and lions larger, which fight among themselves at the bottom of their grisly den, yet seem to carry the whole vast fane as Indians imagine the earth itself to be supported. Their illusionism increases the general effect of elemental force and age, and suggestion as of some terrific enchantment. The Chalukyan reference accounts for the temple's mainly Dravidian style, which is not elsewhere found so far north. A big chunk of rock, which may well have borne the triumphal inscription, has been removed from one of the great standards in the fore-



court, probably by the Chalukyas when they regained the sovereignty two centuries later. Suzerainties in India usually last, like ours, about two centuries, but the Chalukyas had a second innings. There exists, however, a land grant of Krishna's dynasty which records his having made on the mountains of Elapura a wondrous tabernacle, so that the gods as they flew over it exclaimed, "This Shiva-dwelling is self-existent; such beauty is beyond the reach of art". That indeed is very nearly the effect of Indian rock sculpture at its best.

The copious imagery of the temple of course includes the usual episodes, among which that of 'Ravana under Kailas' is surely one of the most grandly imagined and finely wrought groups of sculpture not only in India but anywhere. How subtly and powerfully it enhances the features of the version already considered above, itself no mean conception. It is so placed below the south porch that the demon seems really to agonize at the roots of the symbolical Kailas. The god sits with his bride emparadised on the sacred mountain. In a cavern under crouches the many-handed ogre like an octopus in a sea-cave. The goddess feels the mountain tremble and clings to her husband; her handmaid turns and runs; and though most of the gnomes behave manfully and drop rocks on the heaving monster, one of them has lost his nerve but not his memory of the hymn books, and seeks refuge literally under the throne. But the giant warders remain unmoved, reflecting as ever the mind of their Master, who slowly unfolds his legs and stays the earthquake with his foot. The flight of the handmaid has a pretty nether echo and musical transposition in the still wilder flight of a poor little Nagini, the snake-spirit of some subterranean spring, who finds herself unwillingly involved in Titanomachy. The little figure is armless now and worn with rain, and appears to have escaped the notice of the commentators as well as of the ogre.

Perhaps the most impressive interior at Ellora is the Lankeswara temple, a later adjunct of the Kailas cut at first-floor level in the north wall of the court. The architect has surpassed his predecessors, not as is usual by raising the roof but rather by lowering it. This and the enormous thickness of the closely set pillars in proportion to their height gives the hall an aspect of terrific strength, and keeps the spectator mindful as nowhere else of the weight of the superincumbent mountain, even as their superb decoration reminds him of the sunless treasures of the underworld. The grandest of them all, un-

luckily hidden in the drawing, is carved askew as if crushed out of shape, or as if its volcanic substance had begun to melt again in some passing ferment of the rock. No doubt the artificers thought by this device to avert the envy of the gods at the hall's perfection; but there was an Unknown God called Allah who was not appeased, and much of the delicate sculpture on the walls has been wickedly gashed.

The stately cave called Sita's Bath (it should rather be Parvati's) probably belongs rather earlier in the 9th century than Lanke-swara. It is numbered XXIX and lies about 700 yards north of the Kailas. It is much the largest of Ellora halls, being nearly 150 feet in length and breadth, or about 40 feet longer and broader than the three-storeyed Buddhist cave mentioned above or the Das Avatara. Shaped like a very short-armed Maltese cross, it has an entrance at three of the four transept-ends. One of them looks into a pretty waterfall. Site and style together give it a charm at once classic and romantic. As in many of the Hindu caves the square shrine is detached from the back wall and has a passage round it. Two of its eight colossal door-wards can be dimly discerned in my drawing.

Sita's Bath has its own local genius, but formally it is a close copy of the famous Cave of the Triune Shiva on Elephanta Island in the Bombay Harbour. It is slightly larger and more regular than its model; looks west as the other does east, and is not entered at the corresponding transept-ends. On the preceding page are reproduced together cross views of both caves from the north, so that the shrine of the Elephanta cave, not quite included in the drawing, would be on the right, while the opening through which the Ellora cave is here seen is filled at Elephanta by the image of the Triune Shiva. Unhappily, while what is left of Elephanta sculpture marks the fine flowering of the classical tradition, the colossal reliefs at Ellora are well-preserved but clumsy and ill-proportioned. Perhaps the dilettanti of the decadence gloried in their deformities as urbanely as our own do in the deformities of *Art Now*. . . . At Elephanta, like Saul in the cave at Endor, I saw gods ascending out of the earth. As I stood before the Triune Shiva, perhaps the most convincing vision of Deity ever carved in stone, an old peasant who had followed me round spoke at last in an awed whisper: "*Huzoor, ban gaya*—was it made?"—voicing in three simple words the very feeling ascribed by King Krishna's poet to the gods that visit the Kailas.



Notes and Photographs by Earl Leaf, from Toni M

Gauchos of Argentina

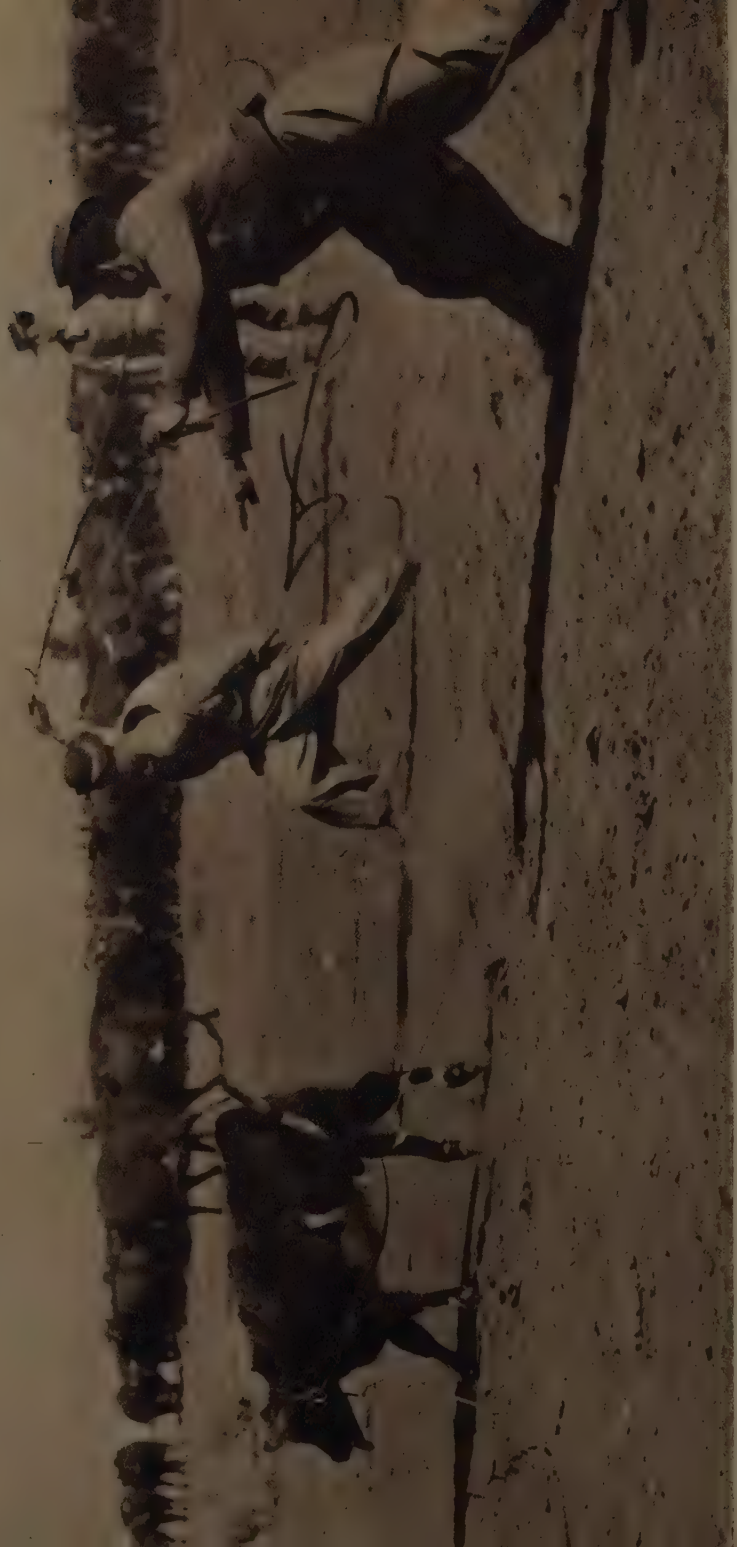
Argentine gauchos, young and old, have worn much the same garb for the past century: up-turned felt hat, many-hued shirt, neck-scarf, ornate silver belt, the inevitable facon (knife), bombaches (wide trousers), a leather apron or sturdy cloth outer-garment over the trousers and heavy leather boots or felt slippers



Round-up time on an Argentine estancia. The gaucho, with his long tradition of reckless, tireless energy, has become something of a national legend. He is an important factor in national economy as well, for the cattle industry is the greatest in Argentina: in 1946 alone—



—in addition to canned beef, 216,500 metric tons of chilled and frozen beef were exported, most of this being sent to the hungry peoples of Europe. The cattle shown above are being driven on the first stage of their long journey to market, slaughter house and ocean freighter



On the Argentine pampa calves are lassoed in the springtime and branded before being turned loose on the range until the following winter



Fine large gauchos supervise the branding of one small calf, whose noisy squeals of protest are probably caused by fright rather than pain



By midday the hard-working gauchos have voracious appetites and the cook-fire proves the most popular place around the estancia. Each man cuts himself off a huge slice of meat cooked over glowing coals in the open.



Ostriches are an important crop on the Argentine pampa: their wing and tail feathers, which provide a yearly harvest, bring high prices. These birds run with the cattle—and run they can, too, as fast as most horses



Boss-rider of the Estancia Santa Maria on the pampa near the Argentine cow-town of Nueve de Julio. The gaucho, quite unlike his slim, lanky, rangy United States cowboy counterpart, is usually a broad giant of a man. His life is as hard as that of any other man in the cattle business: his appetite is absolutely without equal.

Dhow-Builders of Kuwait

by COMMANDER ALAN VILLIERS

THE Arabian port of Kuwait, at the head of the Persian Gulf, is the greatest sailing-ship port left in the modern world. Of its numerous dhows, about one hundred and fifty sail on the long annual voyages from Basra to the Indian or East African coasts. Over a hundred go pearling. Thirty or forty are employed in carrying fresh water from Basra, 150 miles away, and as many in local trade. There is, in addition, a sizable fishing-fleet composed of smaller types of dhows. The deep-sea, pearling and coastal dhows are still built, rigged and navigated as they have been through the centuries.

Kuwait itself is comparatively new, as Arab towns go. The chief—indeed, almost the only—town in the small buffer state between modern Iraq and Ibn Saud's Saudi-Arabia, it owes its prosperity to the port and to the enterprise of its merchants. Less than half a century ago the place was still a straggling, walled town of which few persons, except pearl-merchants, had ever heard; but even in 1820 the port owned two hundred dhows, of which fifteen were more than 100 tons and one was 400.

The dhow-builders of Kuwait are masters of an ancient art. Tradition has it that they came originally from Persia, from Bahrein, and from the ports of Al-Qatar. It is believed by the *nakhodas* (dhow-masters) and shipwrights of Kuwait that the Persian ports of Lingeh and Qishm sent dhows to Africa and India three thousand years ago; now Persia imports its dhows from Kuwait and takes second place in the gulf's deep-sea sailing trade. Kuwait had nothing to offer dhow-builders save a site for their yards—no timber, no raw material for cordage or for sails, no trees for masts, no caulking-stuffs, no metal for anchors or fastenings. Even the first sailors were imported. But as a site for shipyards and as a centre for trade the walled town was unrivalled.

The term 'dhow' is actually used only by Europeans. To the sailing Arabs, ships are known by names which indicate their hull forms. The *boom* is a double-ender with a distinctive built-up bowsprit; the *baggala* has a rounded cutwater and a low prow, a beautiful carved stern embellished with scroll-work, ornate windows and quarter galleries. Both are rigged in much the same manner, with one great driving lateen sail and generally a second lesser sail set on the mizzen mast.

The master shipwrights form a close conservative guild. They are a separate community of Arabs, known as the Baharna, differing in origin and, since they belong to the Shiah sect, in religion from the Sunni Kuwaitis. Since earliest times only experienced craftsmen have been permitted to work on ships. Once progress was deliberately and painstakingly slow, but the exploitation of oil has stepped up the tempo of Kuwait, as has the experience of turning out large numbers of barges for the Allies during the two Great Wars. Baggalas take too long to complete for the modern generation, and their lovely carved sterns are regarded as expensive and time-wasting. The more practical booms (a few of which are now being built to run with engines as well as sails) have almost entirely replaced them.

The booms of Kuwait are usually financed by the city's merchants. The average tonnage of the deep-sea traders is from 130 to 150 tons, though there are still a few larger than this. As the most important trade is in dates, all Kuwait dhows are measured in terms of their capacities for carrying them. Packages of dates in the native trade weigh 180 pounds each; a big boom could easily carry three thousand of these.

The dates are hawked round the coasts of Southern Arabia and to Berbera and Aden, if the vessel is making a voyage to Africa. If her cargo is for India she takes her dates direct to Karachi or Bombay and hawks them at all ports south to Calicut and Cochin, selling when the price is right and engaging in whatever local or coastal trading offers. The African traders generally buy salt and haberdashery at Aden, and ship passengers by the hundred from the Hadhramaut for the roadsteads of eastern Somaliland and for Lamu and Mombasa. Outward cargoes and passengers are always cleared finally at Zanzibar, whereafter the big dhows go to the delta of the Rufiji or to Kilwa Kisiwani to buy cargoes of mangrove poles for sale as building material in Arabia. They trade along the whole coast of East Africa, as far as the northern border of Portuguese East, sailing south with the north-east monsoon and returning to Arabia with the first of the south-west.

Though built with an expectation of fair winds and fair weather, the Kuwait dhows are well made. When a *nakhoda* or a



(Above) One of Kuwait's deep-sea dhows is launched. Sailors hauling a new boom down to the sea over rollers; a wire tackle led to a capstan provides the motive power. When the boom is afloat her masts are man-hauled from the shipyard to the water (left) and floated out to her to be stepped, following which the sailors, many of them of Persian or negroid extraction, will set up the scanty rigging. A merchant can have a 100-ton boom in six weeks if he employs enough shipwrights. They build only the decked hull with poop fitted and complete with rudder. The sailors sew the sails, make the lateen yards, lay and splice coir cables for the anchors and rig the long-boat and the gig. The wheel, binnacle with compass, and the few other items of navigational equipment, come from old dhows or from Bombay junk-yards



(Above) Baggalas (another type of dhow) and booms on a beach near Aden. They are deep-sea date-traders, which usually arrive in December to have their underwater bodies 'repaid' with a mixture of tallow and lime to preserve the wood and prevent inroads by the toredo worm. The long-boats lie grounded near by. (Right) A group of senior nakhodas (dhow-masters) resting in the cool of the evening against a merchant's wall. Just as the shipwrights store their knowledge of ship-building in their minds and have no need of plans or written records, so these men still sail their dhows in the traditional Arab manner without the assistance of modern aids to navigation. Any Kuwait nakhoda could pilot a 300-ton boom into Cochin or the Rufiji, for to him the ports of the tropical Indian ocean are an open book







(Opposite) The stately stern of a large Kuwait baggala. Carving and windows are copied from Portuguese ships, which were prominent in the Persian Gulf soon after Vasco da Gama found the way to Calicut. (Above) Detail of the quarter-gallery and the baggala's poop. Its ports will not open and the gallery is pure embellishment. The small awning covers the nakhoda's bench, on which the captain and ship's officers live. The chair arrangement lashed outboard is a lavatory. (Right) Gowned, barefoot men caulk the hull; on the excellence of their work depends the tightness of the dhow. Interstices between the Malabar teak planks are all carefully filled with caulking stuff and the underwater body is 'paid' with a tallow and lime mixture





photographs by Alan Villiers from Paul Popper

A handsome eighty-foot Kuwait boom. The big jib set to the jib boom hauled out beyond the symbolic bowsprit is a modern addition, copied from European sailing ships. The tree of the mainmast leans forward in order that the lateen yard and sail may swing freely when the ship is put about

merchant decides to build a new boom he usually fetches the necessary wood, cordage and duck for the sails from India himself. There are no plans, not even a sketch in the sand. The ship grows plank by plank out of the master shipwright's mind and by the skill of his hands. Teak logs of the right length are selected for the keel, stem and sternposts; these are put down at a convenient place on the beach and the dhow rises upon them. The knees and frames are Persian wood, grown to shape. The masts are heavy trunks of Malabar teak. The fastenings are of iron.

There are no refinements, either of equipment or of accommodation. The only cabin is a big spare space beneath the poop, generally used as a store-room. Pumping is done by bailing with a leather bucket, and a well is left around the mainmast for this purpose. There are no mechanical appliances anywhere, save, perhaps, one capstan. No paint is used, except for occasional embellishment round the poop, the hull being preserved by lavish coatings of

fish-oil. Crews are large and work on a shares basis.

Though many of the old superstitions are lost, some still persist in the building of dhows. It is firmly believed, for example, that if a barren wife leaps over the keel of a new boom, before the planking is high enough to prevent her, she will conceive a male child; but that, if she does so, one of the carpenters working on the dhow will die, or, failing that, the nakhoda will die on the first voyage—a life for a life. Nowadays when a keel is laid in Kuwait, guards are posted to foil the designs of barren women!

The dhow-builders of Kuwait seem incapable of producing sea-going vessels that have not beauty. Even the long-boats are works of art, while the booms themselves, though developed only by eye, have lovely lines, are fast and reasonably seaworthy, steer well, handle easily and can run twelve knots with ease.

Aye, they are good ships, these deep-water dhows. Having made an African round voyage in one of them, I ought to know.

Tribespeople of Kenya's Northern Frontier District

by ALYS WINGFIELD

Paintings by JOY ADAMSON

KENYA'S N.F.D. is roughly 100,000 square miles of barren country that stretches from Lake Rudolf in the west and along the borders of southern Abyssinia and Somaliland to the Indian Ocean. Its southern boundary runs within fifty miles of Mount Kenya and the green fertile farms owned by Europeans on its slopes, and then follows the Tana River until it reaches the Coast Province. This vast region, which is half of Kenya from a purely territorial point of view, is mainly flat, thorny scrub on pale dust, or colourful iron-stone, or black lava desert. The level landscape is broken with rocky outcrops and rugged little hills that are infinitely blue in the haze of distance. There is no white settlement and the only white people, apart from visiting big game safaris, are the administrative and police officers. The numbers of the N.F.D. tribespeople are put at about 100,000—roughly one person per square mile—and the first impression the visitor gets is that of emptiness, even desolation. The vast herds of camels, cattle and sheep are rarely seen from the main roads and keep to the bush.

The country is a hard one; perhaps one of the hardest in the world. Life is an endless search for enough water and grazing. In a bad year many vital waterholes will fail, and trouble will start between tribe and tribe, even between clan and clan. Towards the end of the dry season—especially if it has been a particularly severe one—a sense of impending calamity hangs over the air. Strained faces are turned towards the east, looking for the first hopeful signs of a change in the weather. Sheikhs and witch-doctors are consulted, the turn of the moon is anxiously awaited. Tempers are frayed, and quarrels break out on the least provocation. The listless cattle mooch from one dried blade of grass to the next, and if the drought is unduly prolonged, every day takes its toll in human life as well as that of the stock. When at last the rains break the tension almost magically eases, and the animals fatten and regain the truly amazing condition which never fails to impress the newcomer when he finds cattle grazing on what looks like a sea of lava boulders.

It will be seen that the pattern of life in this

hard country is truly biblical, enlivened with the constant threat of raiding. The people themselves might for the most part have stepped straight out of the Old Testament.

The main races of the N.F.D. are Galla and Somali, and are believed to have their beginnings in the Koreish Arabs, but that is going back well over a thousand years. In the east and north the Galla were here first. They seem to have occupied most of the Horn of Africa which is now Somali country, most of the N.F.D. and the coast country as far south as Malindi. Both races are almost entirely nomadic.

Tradition has it that a Hindu trader called Ram Nag used to visit what is now the Somali coast to trade, and in order to get on better with the local inhabitants, who were mainly Galla at the time, married a Galla woman, by whom he had one son. This son in due course inherited very considerable wealth and was called Zumal or Zumali, which means the wealthy. Zumal had three sons, from whom sprang all the manifold tribes and clans known today. It is believed that the total Somali population is now over 2,000,000. Soon after Ram Nag founded this virile race came the first of the Arab Mohammedan expeditions, partly to trade, partly to look for slaves and partly to spread their faith. The Arabs intermarried with the Somalis, increasing the amount of Arab blood in the present-day Somali, and converting him to a fanatical Mohammedanism.

The Galla round the River Tana have had a great deal of association with the Somalis, who have variously made agreements with them, enslaved them and married their women during the last century; so that this branch of the Galla people are nowadays largely Mohammedan.

On the other hand, their cousins the Boran remain almost entirely pagan. They have had remarkably little contact with European or even Abyssinian civilization. They seem even to have escaped Somali influence. The bulk of the tribe lives in Abyssinia, having been acquired at the close of the last century by Menelik, who looked on Borana and similar outlying districts of the Ethiopian Empire as convenient buffers between his

kingdom and the oncoming waves of European civilization in the general scramble for Africa. Their wealth is mostly in cattle, though in the highlands of Borana they rear a sure-footed, narrow-chested breed of pony which they use mainly for hunting.

The Boran man (fig. 1) is wearing the *kalacha*, the *Gedamoche* emblem. This appears to be the only phallic emblem in their practices, and its only significance now is that it is supposed to have appeared miraculously at the birth of a High Priest many generations ago.

The *Gedamoche* is an eight-year period of initiation as a full member of the tribe. The whole tribe is divided up into five *lube*. When one *lube* has finished the next begins, until all five have had their turn, when it comes round to the sons of the original *lube*, the *lube* keeping to the same names. That is to say, a man and his sons belong to the same *lube*, but thirty-two years apart. At the beginning of each *lube* the candidates band together in small parties and live apart and under a few restrictions. They must carry a staff instead of a spear, and do no manual labour—no privation that. Some of the usual foods are forbidden them, and they are credited with powers for good and evil, as they are supposed to be in close communion with the deity. Another curious point is that they are supposed to use words which appear to be relics of a dead language when speaking of everyday details such as milk or meat.

During the *Gedamoche* the initiate unravels his *gutu*, a little rat's tail of a pigtail grown from the crown of his head which

indicates that his own father duly underwent the *Gedamoche* ceremonies and that he himself has killed a man or a big animal. When the *gutu* is unravelled his wife and son weave fibre into his hair to form the *guduru*—the halo effect in the picture.

During the seventh year the sons of the *Gedamoche* are circumcised. Owing to the big intervals in the *Gedamoche* cycle it often happens that these sons have married and begotten children themselves before their circumcision. These uncircumcised sons are called *Raba*. In the old days any children they had were abandoned in the bush except one, who was allowed to be reared—but only as a girl—until his father's circumcision, when he was restored to his sex.

When the eight years are nearly over the *Gedamoche* congregate in one or other of the holy places. Each man must go to the holy place of his father's initiation. The village is laid out facing away from the holy place and the doorway of each hut is decorated with *koti* branches. Days beforehand are spent sitting silently or in conference under the holy tree. The night before the final ceremony the whole *Gedamoche* village keeps vigil, and passes the night in song and dance of a stately nature.

Towards dawn the sons of the *Gedamoche* sacrifice bullocks—one to each *Gedamoche*—and the *guduru* is shaved off with due ceremony. The wife has first cut, wearing a special back-to-front apron of beads and cowrie shells and wooden bells. After that the *Gedamoche* hides in his hut and no one may see him for twenty-four hours, while the wife and sons bear away the shavings in a bowl of milk and bury it with ceremony. His small sons wear the *kalacha* for the rest of the day and have a good feed on the sacrificial bullocks, whose entrails are examined thoroughly with the help of the local soothsayer to see what the future has in store. Outside each hut is an oxhide decorated with signs of the man's qualifications. Red blobs mean that he has killed a man, stripes one way represent a buffalo, and so on. If you ask what man they killed they nearly always say a *Jam Jamtu* in Abyssinia. Indeed the *Jam Jamtu* appear to be their traditional enemies, and held up the proceedings last year by killing the *Kalu* or High Priest and stealing his badge of rank.

The Boran deity, and that of such *Tana Galla* as remain pagan, is invisible and good. Some of their prayers as recorded by Tutschek in 1845 could be read in an English church without attracting notice. Take this, for example: "Oh God, thou hast let me pass the night in peace, let me pass the day in peace. Wherever I may go, upon my way which thou



A. J. Thornton

1. Boran Man





2. Turkana
Man

3. Turkana
Woman



4. Rendille
Man



5. Rendille
Woman



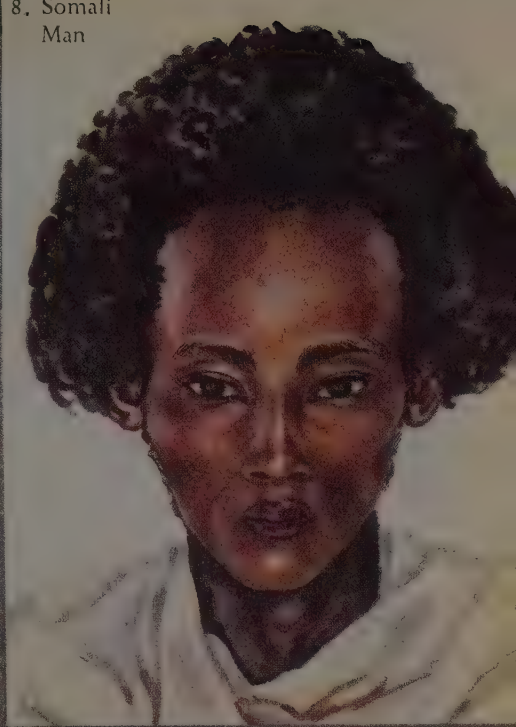
6. Gabbra
Woman



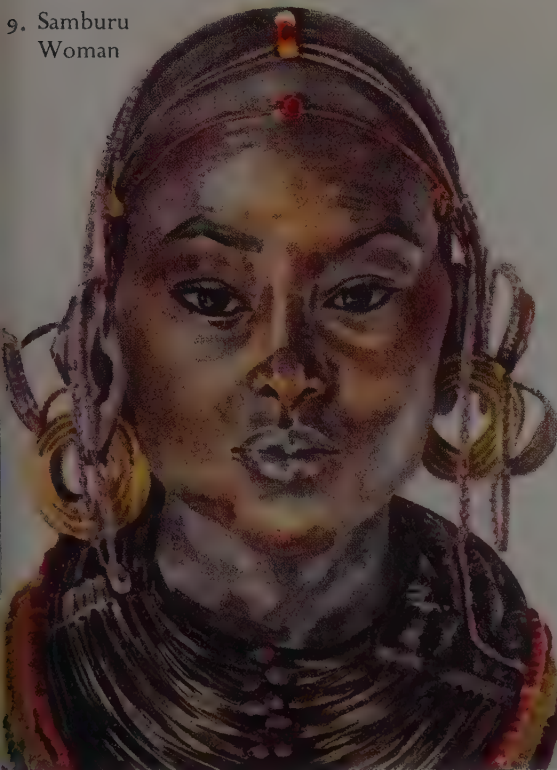
7. Malakoti
Woman



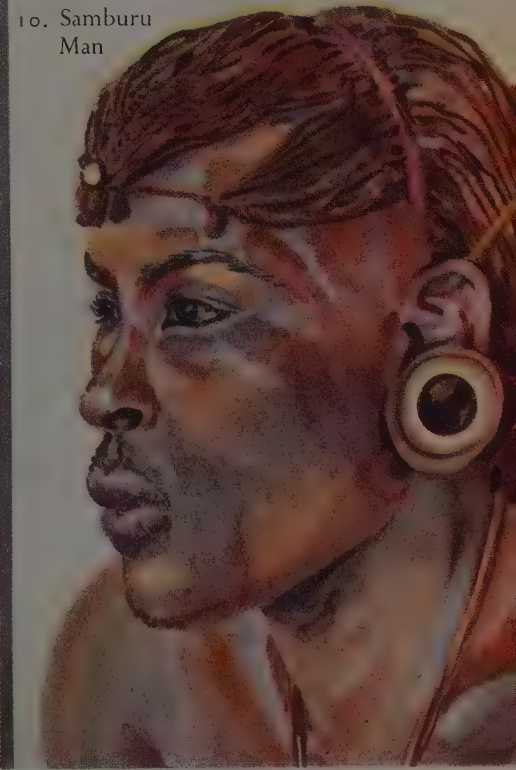
8. Somali
Man



9. Samburu
Woman



10. Samburu
Man



11. El Molo
Woman



madest peaceable for me, Oh God, lead my steps. When I have spoken, keep off calumny from me; when I am hungry keep me from murmuring; when I am satisfied, keep me from pride; calling upon thee I pass the day, Oh Lord who hast no Lord!" The pagan element is more to the fore in their snake worship and in their general way of living and cruelty.

The Turkana as a tribe belong to the other side of Lake Rudolf, but they have filtered into the N.F.D. as labourers in considerable quantities. During the 1914-18 war they were causing trouble and gravely harassing us at an awkward time, with the result that a punitive expedition was sent against them. Unfortunately this expedition was unduly harsh, and many of these virile and usually amenable people were left with literally nothing on which to live, which explains the large migration in search of subsistence to the east and south of their normal habitat.

The old Turkana man in figure 2 has a fine mud bun which is supposed to incorporate the hair of his ancestors. If he is very hard up he will no doubt shortly cut it off and sell it to someone of superior station whose own father let the family down by going bald. These people are blacker than most of the N.F.D. tribespeople and though many have very primitive faces they are attractive. On ceremonial occasions they wear skins and ostrich feathers. If you meet a lone man walking in the bush he will probably be wearing a circular knife round his wrist and possibly a finger knife for the purpose of gouging out his enemies' eyes if necessary. They are extremely brave, and will singly tackle an elephant or rhinoceros with only a spear. They make fine game scouts and trackers, having a sixth sense where big game is concerned. Needless to say, a certain amount of poaching is indulged in.

There is a nice story of one particular poacher called Atukan who gave the Game Department a lot of trouble, and was not above rolling boulders down a hillside on his pursuers. He managed to evade capture for a considerable time, and then one day he was brought in smiling to the Assistant Game Warden's camp, having allowed himself to be taken without a struggle. When asked why he had tamely given in after putting up such a fight he explained that it was his custom every day to throw his sandals in the air and to tell his immediate future by the way they fell. That particular day they had seemed to foretell disaster, and there was nothing for him to do but to accept his fate philosophically. His behaviour as a prisoner was exemplary, though with a proper pride he assumed he was prisoner No. 1, and he was

later taken on by the Game Department.

The Turkana woman (fig. 3) has shaved her head except for the crown, and the remaining hair is made into minute twists. She wears nothing but skins, though she is usually loaded with coils of spiral wire or beads. The little girls wear bead-embroidered leather aprons, and the little boys nothing at all.

The Rendille (figs. 4, 5) are some of the best-looking people in this part of the world, and though they look distinctive, their origin—perhaps Masai—is obscure and mixed, and they have come under great Somali influence at some time in their history. They have however reverted to unadulterated paganism, and there are traces of a phallic cult among certain of them. They are tall—frequently over six feet—and graceful. Their skulls have a noble shape and look attractive even when shaved, as they so often are among both men and women. The woman with the cockscomb is a young married woman, but the old women and virgins are usually shorn. They are charming socially but rather a thorn in the flesh of administrative officers, for if they do not like an order they fade most successfully into the landscape.

They are mainly camel folk, and very often their houses on the move are no more than a loose screen of skins on the windward side, and open on the other. Their children are among the happiest native children to be found anywhere, and race around stark naked in the highest spirits as they herd the camels. Often you find six-year-olds in charge of a mob of truculent camels, and they make a charming picture as they try to discipline the ungainly beasts which tower over them. Their grazing ranges from the wonderland of Mount Kulal overlooking Lake Rudolf, where they keep most of their cattle, to the lava boulders of Laisamis where nothing but a camel could live.

The Gabbra (fig. 6) are related to the Boran, with many similar beliefs and customs, though there is nothing like the Gedamoche. They live mainly around the Hurri Hills—too near the Frontier for them not to have suffered greatly from raids from over the other side. In the past they were considered rather two-faced because while protesting against the inadequate British protection they received against Border raiders they hindered action being taken against such parties by entertaining them and helping them with food and shelter, not reporting their movements until they were well away. As prompt reports would have led to severe reprisals not only on them, but on the considerable remainder of the tribe in Abyssinian territory, that seems a reasonable, if not inevitable, line for them to take.

The woman in figure 7 is a Malakoti and belongs to one of the tribes who cultivate the banks of the River Tana. It is possible that they are the old indigenous people who were there before first the Galla and then the Somali penetration. They call themselves *Melwana* which means 'freemen', and this may mean by that they are a freed slave tribe. Surrounded as they are by Islamized Galla and the fanatical Somali they are turning to Islam, which is a good thing as it is sounding the death knell of Ngaji, a curious form of devil worship designed to exploit simple souls and ensure a good supply of food and drink for those behind the racket. Within the last twenty years Ngaji terrorized the Riverines, when the peculiar booming noise made by the Ngaji echoed down the river and brought instant tribute, but now it seems to have died a sudden death, and even to be an object of ridicule among the younger members of the river tribes who dance round a dummy Ngaji and make fun of it.

The life of these Riverines is a hard one, and perhaps there is some excuse for their occasional orgies of drink. The Tana flows its swift way through very loose soil. Last year there were very heavy floods after the first planting had been done. In places the floods were more than two miles across and when they subsided it was found that here and there the river had changed its course, thereby upsetting the plans of the diligent cultivators. Every little mud flat has its patch of rice, every swamp its crop of maize or millet, and the Riverines work away, undaunted by the incalculable river or the ravages of baboon and elephant, rhinoceros, waterbuck and hippo.

The most important tribespeople in the eastern half of the N.F.D. are the Somalis, of whom there are about 60,000 or rather more than half the entire population. There is no complete tribe or clan in the N.F.D. Like the Boran and Gabbra who live half in Abyssinia and half in Kenya, the various sections live mainly in other territory, either Abyssinia or Somaliland. The man in figure 8 is a young Abd Wak from Garissa on the Tana.

Among Somalis there has been for some time past a distinct trend to move south and west, and as far as the N.F.D. is concerned most of them are newcomers, within this century. About 1909, the Abd Wak and Abdulla reached the Tana country where they are now obliged to keep prescribed grazing areas. Before then the country was almost entirely Galla. Somalis are mainly camel folk. They are highly-strung and excitable, and this is sometimes explained away by the fact that

they live mainly on camels' milk which is very deficient in fat. They are attractive, intelligent and proud. For years they have been regarded rather as the aristocrats of East Africa and certainly they regard themselves as such. For a long while they were somewhat non-progressive, content to keep to the traditional way of life and do little but ranch stock. Now, however, they realize that the much despised Bantu folk are getting ahead of them in their standard of living, and they are clamouring for schools.

The Samburu (figs. 9, 10), who live in the west of the region and have a reserve of their own in the neighbouring province, are closely akin to the Rendille; in fact they themselves usually say they are one and the same people. They are mainly cattle-owning folk, and as they live in better country are less nomadic. Their young men of the so-called warrior class often strike one as being rather effeminate, and this impression is heightened by the irritating way they have of fiddling with their braided hair. This curious style is produced with the help of animal fat and red ochre. They also colour the rest of themselves with red ochre and wear cloth dyed with the same earth. They are recorded as being a timid people who have suffered greatly in the past at the hands of raiders from Abyssinia, the Masai (who are supposed to be related to them), the Turkana and Somalis.

The El Molo (fig. 11) are the remnants of a fishing population at the south end of Lake Rudolf. Their main claim to distinction is that there are practically none of them left, not more than seventy at the present time. They are tall, often with curiously shaped skulls and protruding, blotched lips. They spend so much time in the water, fishing mainly with harpoons, that this may be the cause of their marked physical degeneration, unless it is due to in-breeding. Their diet is varied with an occasional hippo or crocodile. It is often remarked that they are apathetic and have no wish to learn from their wealthy Rendille neighbours. But as they appear to be the remnants of a once flourishing fishing community who stretched up the eastern shore of Lake Rudolf and lived in contented plenty until they were raided nearly out of existence by Gelubba from the Omo delta, they may regard their poverty as an insurance against persecution.

The African is a philosopher. When disaster overtakes him, as it so often does in the form of raiding, disease, drought, locusts and so on, he scarcely wastes time to sigh. He says gently that it is the affair of God, and goes quietly on his way.

Geography and the Botanist

by F. KINGDON-WARD, B.A., F.L.S., F.R.G.S.

During the past two years we have published several articles designed to show that geography is concerned with far more than the mapping of topographical features; and that practically unlimited fresh fields of exploration are open to geographers in the study of the relationships between men, animals, plants and their varied environments. Mr Kingdon-Ward, the distinguished botanical explorer, shows yet again, in the following article, how fruitful is the geographical or 'ecological' approach to a subject which can remain comparatively sterile in the hands of narrow specialists

STARTING with the premise so well put by Lord Rennell in the December 1945 number of *The Geographical Magazine*, that "geographers are concerned to establish the basis for a satisfactory relationship between man and the earth on which he lives", we shall not easily be persuaded that the relationship can be a simple one. Turn which way we will, we perceive how deeply involved it is. For though we may consider that man adapts himself to his environment, we really know very little about

the many environments, or how man adapts himself. He can indeed to some extent alter the environment to suit himself as a social animal! Moreover we are likely to reach the conclusion that any adaptation is an unstable one, a continuous becoming rather than a perfect state finally achieved; for the environment itself is ever changing. And if, as naturalists, we feel that observation in the field is of fundamental importance—that we cannot do too much of it—we shall not lack



By courtesy of the British Museum (Natural History)

A. J. Thornton

A map showing the floral regions of South-East Asia. A floral region is one, the land surface of which has had a common geological history, at least in recent time, so that its vegetation has occupied the area over a fairly long period relatively undisturbed. Hence it comes about that some families of plants are peculiar to, or at least highly characteristic of, the region. Owing to our ignorance of the distribution of species and genera, these floral regions are only roughly delimited, with approximate boundaries. No account, it will be seen, is taken of political frontiers

the support of philosophers. Hume wrote that "to find anywhere at any time throughout nature the effect in its supposed cause is impossible". And Professor Macneile Dixon adds: "How then do we know what to expect in Nature? Only previous observation can tell us." Clearly this is a lesson the naturalist-geographer must take to heart. Thus there are three matters with which the botanical explorer concerns himself: plants, environment, and adaptation. To which we may add, their distribution in space and time.

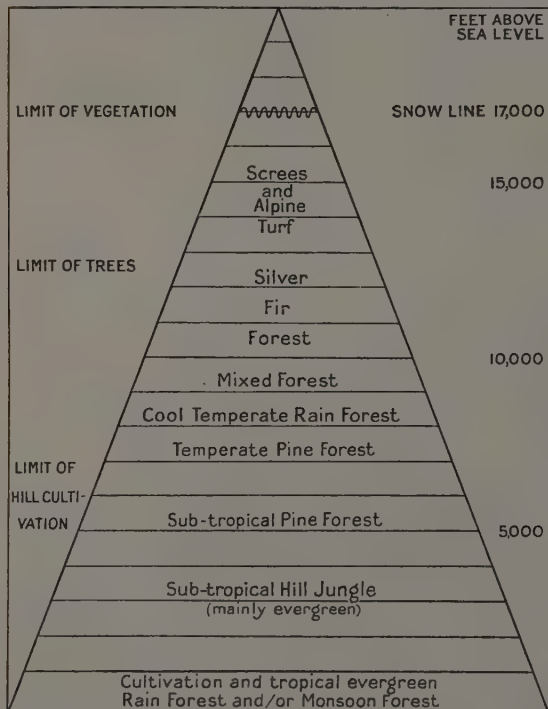
DEFINING A FLORAL REGION

Environment is a very complex affair. It is made up of many separate factors each of which reacts on, and is in turn reacted upon by, all the others. Adaptation too is necessarily complex; it is never perfect, never completed. However, let us begin with plants, the raw material. The modern botanical explorer chooses his field of observation carefully, with a definite object in view; even if it is the comparatively simple one of collecting plants only. Nowadays he starts with the advantage of knowing in general terms what

plants he is likely to find. By putting together all available knowledge of the world's flora, botanists have been able to map out a number of 'floral regions' based on the more or less close relationships of the majority of plants in the region, and the proportion of endemics to the whole flora. These floral regions, which are of course not rigid—for no region is completely isolated in nature (if it is today it was not so yesterday)—serve as a useful starting-point. Few botanists have the comprehensive knowledge necessary to grasp the world's flora, but anyone, by concentrating on one region, can equip himself to extend our knowledge and add new facts which will help in putting the pieces together with greater precision. His first business then will be to acquaint himself with the local flora, that is the species which grow in his chosen region, and this will be done by intensive collecting, his specimens being carefully labelled and accompanied by full and accurate notes; the object being to give as much information as possible. That is the first step—but it is only a step.

During the past twenty years, by exploring the mountains between Bhutan and Yunnan

I have been able to trace many plants, previously regarded as exclusively Chinese, westwards across the top of Burma as far as the Eastern Himalayas; and Himalayan plants eastwards into Tibet and China. From this has emerged the conception of a hitherto unrecognized floral region, Sino-Himalaya. Are there enough endemic genera—enough large groups of plants peculiar to this limited area—to support this contention? Endemic species abound; but endemism of a higher order is needed to establish a major botanical region. Moreover, endemics have a thrilling habit of repudiating their endemism. It is not possible to say that a species does not exist in a certain region, but only that it has not been found there. You cannot easily prove a negative. The botanical explorer is continually being nonplussed by unexpected and sometimes inexplicable discoveries; and few things are more exciting than finding a known species which, according to rule, has no business to be there. Thus in 1942 when walking out of Burma I found *Primula farinosa* growing by the hundred in a bog on the Burma-Tibet frontier. Geographical botanists have said that *P. farinosa* is confined to the



A. J. Thornton

Vegetation Belts in the Eastern Himalayan Region

North Temperate and Arctic zones north of about the 45th parallel, and that it is unknown in the Himalayas and Western China, where some three-quarters of the world's primulas are concentrated. Yet here it undoubtedly was, defying the rules! Nor is it enough to revise our statement: we have got to account for its unaccounted presence; *how* did it get there?

Thus the discovery of every new species creates new problems while helping us to solve old ones, just as the discovery of a new locality for a known species does; the latter is often the more important of the two.

While he is collecting specimens the explorer is also observing. The stratification of vegetation in the mountains is obvious to the layman. No one could fail to note the change from evergreen rain forest in the deep warm valleys of North Burma, through semi-deciduous forest and conifer forest, to the treeless alpine region. These zones of vegetation can be classified on the basis of climate—notably the occurrence or not of frost, and the degree of summer heat, humidity, and drought periods—and the flora of each zone recorded. Flora and vegetation between them constitute the first rough botanical survey of a region.

The stratification of life is a necessary corollary to the three-dimensional living space; it follows as a result of the earth's stratification. Even the crust is stratified, but since life inhabits only the topmost stratum, being practically a surface film, we need not let it detain us. The sea, however, is also stratified, and the atmosphere, and life in the sea is also clearly zoned. On land it is in mountainous regions that life is most obviously stratified or zoned; and this applies as much to mammals, birds, reptiles and insects as to plants. But in the case of plants, which are static and all-pervading, the fact of stratification is inescapable. There is even a stratified life inside the high forest, a tree-top life which keeps entirely to the canopy overhead.

It will be as well to emphasize here that no accurate observation, whether botanical or zoological, is too trivial to record. I well remember once in the Chinese mountains coming on a colony of caterpillars feeding off



All photographs by F. Kingdon-Ward from Paul Popper

At 16,000 feet between Burma and Tibet; a high alpine region near the snow line. Climate controls the scanty vegetation. Neither men nor animals have any effect and there is practically no competition between one plant and another

a bush. As I approached they all, as though at a given signal, rose upright on their tails and jerked their heads to and fro. Then when still further alarmed they 'spat' at me. Though I am not an entomologist I was so struck by this, to me, novel method of scaring possible enemies, that I mentioned it briefly in a book. Many years afterwards the late Professor E. B. Poulton wrote to me asking for further details for a lecture he was preparing. It was only one of a large number of similar observations by entomologists, but it helped to adorn a point.

THE ECOLOGICAL APPROACH

Having finished his first botanical survey of the region (and this may take months or years according to its size and complexity), what is the botanist's next step? Today he can be



(Above) The arid Tibetan plateau north of the Himalayas. Man brings water to the natural terraces, grows crops and a few trees. Cattle graze over the stubble. This type of cultivation is only possible at intermittent points, where there are adaptable streams. (Below) Cattle pastures, man-made, and cattle contour tracks, at about 9000 feet in the eastern Himalayas. In the sub-alpine and alpine region, the usual result of clearing pastures is invasion of the area by a few species, which may occur in prodigious numbers: see picture opposite





Boggy alpine meadow, the result of cutting rhododendron to increase pasture for cattle, at about 12,000 feet in the same region. The cattle discriminate and will not touch the little yellow Primula Dickieana, which consequently carpets the ground, thriving at the expense of other flowers. These are cropped before they can set seed



A hill clearing in the sub-tropical rain forest in North Burma at 4000 feet. The forest was cut down in the dry weather and burnt. After clearing up, hill rice was sowed. It has just been reaped. Next rains the site will be covered with weeds—but only of those species which already exist in the district

most useful as a member of a team which includes a zoologist, an ornithologist and an entomologist. In little-known parts of the world, where the chief object is to collect specimens, he can help them in a variety of ways, as they can help him. Who knows which birds are harmful and which beneficial to the hill tribes of North Burma? By discovering what they eat—whether grain seed or noxious weed seeds on the one hand, or insects, some of them harmful, others beneficial, on the other, it is possible to arrive at a fair verdict. This work is best undertaken by the botanist analysing the contents of birds' crops in freshly killed speci-

mens. So we come to the study of ecology. An area with its living contents, such as plants, birds, insects, mammals, etc., may be regarded as an entity made up of a number of interacting and competing parts which unless interfered with remain in equilibrium over long periods of time. Important influences are: climate, soil, and man himself. In the main, the *type* of vegetation depends on climate; thus we find the same type of evergreen forest in the lower valleys of the Amazon, Congo and Salween rivers. Its *composition*, however, is very different in all three; the flora depends largely on past topography and plant migrations. So we are taught! But if the topography was different, the climate also must have been different! What effect had *this* on the past vegetation? Can we read any of the story in the present vegetation?

It is to changes of climate and of topography that we must turn for a solution of many puzzles, for example the discontinuous geographical distribution of certain plants. Some of the plants we find in a given area today are completely cut off from the main body of their relations; there is no visible route by which they could have come. Yet come they did. At this point the botanist calls on the geologist to help solve his problems. The geologist tells him that the topography has changed.

Large entities like the Central Asian desert region, or the Amazon basin, are themselves floral regions. They must not be confused with *climatic* regions which are often separated by oceans. For example the type of vegetation met with in the South African desert resembles in many respects that of the Brazilian arid region, just as the European forests resemble those of North America; but the *species* in both cases are very different. They belong to different floral regions, though the climates are alike. Like climates produce like external forms, but these have little to do with the relationships of the plants. The practical ecologist, however,

must necessarily work with small units, a few square miles or a few acres. Continuous observation accompanied by experiment on a few square yards may yield better results than vague generalizations covering a large area. There is no part of the world where first-class work cannot be done in ecology, which is still in its infancy. If I draw examples from South-East Asia only, it is because I have personal knowledge of that region: similar problems crop up all over the world. Nevertheless I believe that more ecological problems arise in mountainous regions than anywhere else, especially along the boundaries of floral and climatic regions, as in South-East Asia.

FROM BARREN SOIL TO CLIMAX

For any climate and altitude there is a certain type and maximum pressure of vegetation and associated animal life which is the biological optimum for that particular region under that climate. No more compli-

cated association of plant life is possible until the climate or the topography changes. Any departure from the climax, as it is called, is due to some outside influence—a landslip, an avalanche, and of course human interference in all its forms such as cutting, burning, cultivation, grazing, road-making, and so on. Yet one finds species whose presence is hard to account for under the present régime; they may be valuable indicators of the greatest though most gradual disturbing influence of all—a changing climate.

The botanical explorer can do no more useful work than observe the sequence of vegetation, from barren soil to climax, as for example on a landslip which sterilizes the mountainside temporarily; or on a newly fallen naked rock in the alpine zone. This, however, implies a number of visits over several years. Neither forest nor meadow in a climate suitable to these types is established immediately, and the steps leading up to them are rarely known. Some years ago when we were exploring the sources of the

Path through sub-tropical hill jungle, North Burma. A typical herbaceous flora grows by the roadside



Irrawaddy, a mud-slide came down in the night and wiped out our base camp. When I visited the spot I found a sea of soft mud spread over the valley, completely sterilizing the area. All vegetation was buried. Six years later I happened to pass that way again. A dense grove of alder trees had grown up, hiding the scar. There had been few or no alder trees there before the slip—and quite possibly they have in turn disappeared today, replaced by a variety of trees which have sprung up under their shade, and slowly killed them out.

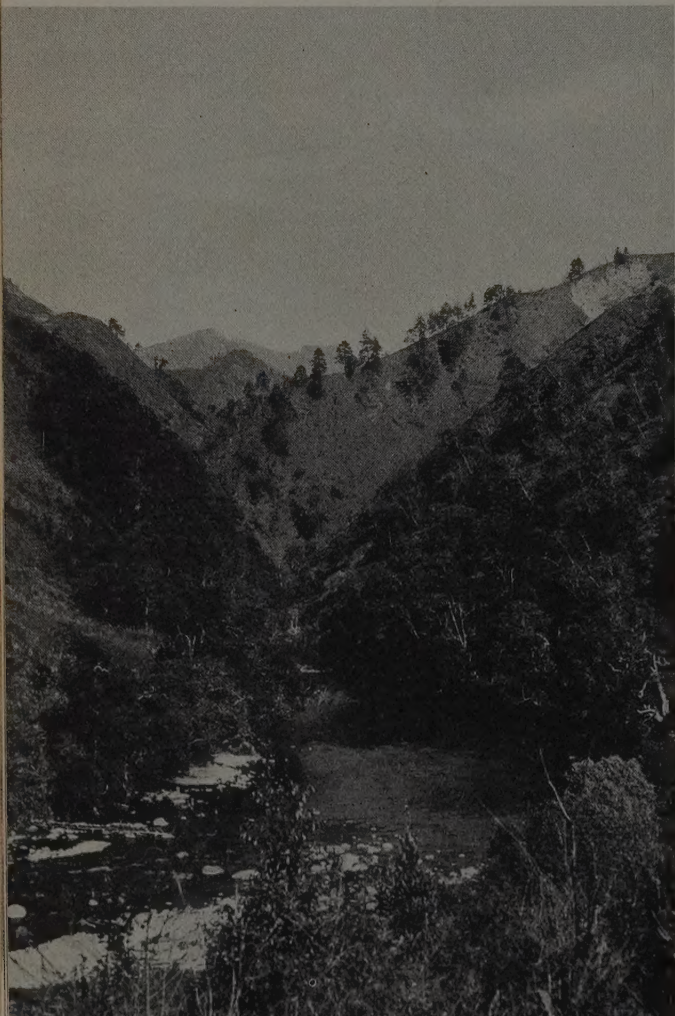
PLANTS AND ANIMALS

Of the relationships between plants and animals one could give many examples. In North Burma certain species of rhododendron are probably pollinated by birds, though this cannot be taken as proved conclusively. The birds visit the flowers, not for the sake of

the pollen but for the insects they find inside the corollas. Do the birds, many of which are migrants on their way to Tibet, follow special valleys northwards because of the rhododendrons found there in bloom at the appropriate season? How many of the hundred-odd species of rhododendron found in North Burma are pollinated by birds, and how many species of birds perform this useful office—if any do? That many birds go from flower to flower carrying pollen on their heads, and that they must rub it on the stigmas of other flowers, is certain. They therefore undoubtedly assist pollination of flowers on the same bush and on different bushes of the same species; but do not necessarily carry pollen from one species to another. Consider, however, this point: that rhododendrons are amongst the easiest flowers to hybridize artificially and that a natural hybrid is a great rarity! The inference is that some other

factor prevents cross-pollination; or else that hybrid rhododendrons fail to reach maturity in natural surroundings.

Plants convey information to the botanist about the state of the soil, and something of the history of the area. But he must know the climax. If there is a marked departure from that, plants will indicate whether the soil is drier or wetter than the optimum, or whether man has been at work. In the high Tibetan pastures one can always tell where a nomad encampment has been not only by the docks, sting-nettles and other weeds which mark the actual site of the tents, but by the far more beautiful primulas which revel wherever the grazing yak



South-facing slopes, on the Ngaw-chang river (North-East Burma frontier), cleared of forest to encourage grass, which can then be burnt over annually. Only pine trees are able to survive these annual fires, producing a stable pine-forest type of vegetation. Forest still lines the rivers, all deep gullies, and northern slope



Rice terraces in Western Yunnan. The forest was cleared long ago and the slopes terraced to permit irrigation and stop soil erosion. Here no burning is needed: there is a shortage of firewood

have enriched the soil with their droppings. In June before the cattle came up from the valley I was able to recognize the previous years' camps a long way off by the patches of emerald green grass and splashes of vivid yellow *Primula strumosa*. I could also trace the route taken by the cattle through the forest from one pasture to another by two species of primula which grew alongside the path, one of which grew nowhere else and the other only sparingly. The practical use of such observations is obvious. On another mountain I saw the herdsmen cutting and burning the scrub to increase the growth of pasture for their cattle. Unfortunately the ultimate result was to increase enormously

the numbers of *Primula Dickieana*, a beautiful little flower which the yak obstinately refused to touch! Though the immediate effect of clearing the scrub was to increase the pasture, the ultimate effect was to turn the alpine region into a bog garden carpeted with one species of primula.

Certain kinds of bamboos flower only at long intervals; and when they do, all plants of that species over a large area are liable to flower simultaneously. The result may be famine, as I found in North Burma, where there had been such an increase in the jungle rat population as a result of the increased food supply that when the bamboo seeds were finished, the rats were driven

by hunger into the crops, which they destroyed. The botanist might at least be able to predict when the flowering of the bamboo is due.

SOME PUZZLES OF ENVIRONMENT

What determines how many plants grow in a given area and in what proportions? What determines which plants are rare and which common? Only the seeds of plants which already occur in the neighbourhood will ever reach a newly cleared area, and those which have the best means of dispersal, such as wind-borne seeds, are likely to arrive in larger numbers than those with a poorer mechanism. They therefore have the best chance to establish themselves. Nor is it a measure of the number of seeds each produces. Even when there is little or no competition, and wide areas are open to free settlement, as in the high alpine zone, plants which produce an immense number of seeds, *e.g.* some species of *Meconopsis*, are rare and widely scattered. Here, however, the struggle is not between plant and plant, but between plant and climate.

Collections of small mammals—shrews, voles, mice, etc.—have been made at one or two spots in North Burma, but we are very far from having a complete picture of the small mammal population. Many of them are vegetarian, but what influence they have on plant life is not known. Voles appear to migrate vertically at certain seasons and I have noticed a good deal of damage to young alpine plants in the spring caused by these animals. But on all these matters we are almost completely in the dark. The food of arboreal mammals such as squirrels is more easily ascertained. What effect the millions of small mammals and billions of insects, molluscs, worms and other hidden forms of life have on the forest as a whole, we have only a vague idea.

THE METEOROLOGICAL FACTOR

Ecological studies are probably the most fruitful the naturalist can undertake today. But before he can make any headway, he needs some knowledge of the fauna and flora and their distribution. For a long time to come the field botanist will have to devote a large part of his time to collecting, in order to discover the *contents* of his world. However, there is no reason why he should not at the same time carry out some ecological studies. A unit working in the field should comprise several experts, as previously mentioned, and between them they should make adequate

meteorological observations. The more intensively they study one region the better their results are likely to be.

Here is a puzzle for which meteorology might supply an answer. In parts of South-East Asia are many hundreds of square miles of pine forest, the trees widely spaced, with grass and bracken undergrowth and scattered bushes. Such valleys are inhabited, and every dry weather the people burn the undergrowth, damaging but not killing the trees. This has been going on for generations. It is clear that the pine forest, though stable, is not a true climax; were it not for the regular fires sweeping through the undergrowth, it would be different—but *how* different? How has this particular climax arisen? We find growing here even a few plants which are not found elsewhere in the neighbourhood. How did they get here?

Bird and wind distribution of fruits and seeds acting over long periods of time are potent means of transport, but we know all too little about them. Possibly there are Gulf Streams of the atmosphere which carry light seeds regularly over long distances. Again in the alpine region and in the deep river gorges, the wind blows constantly. A seed or fruit carried off a high mountain across a valley may strike an updraft that will lift it to 40,000 feet and it may be long before it comes to earth again.

But not all plants have fruits or seeds capable of air transport. In the jungle, numbers of heavy fruits fall straight to the ground and decay. They furnish food for innumerable insects which live in the soil. Even the few seeds which escape and germinate rarely survive long. The forest is already overcrowded; there is not even standing room. Until a tree dies not another one can squeeze in. Yet if a clearing of an acre or so is made in the forest the first plants to spring up will be quite unlike those of the surrounding forest. Whence are the intruders derived? At every turn life clashes with life, and to get ahead plant or animal must be a little better adapted than its competitors.

What bearing on geography has all this? On what may be called "atlas geography" it has no bearing at all. But "atlas geography" is only a very small fraction of the subject. Man has a vital relationship with the vegetation of the earth. He could not live at all in a world devoid of plant life; and the more he understands about it the better he will live. Food, clothing, textiles, timber, healing drugs and not least the soothing balm of beautiful trees and flowers all depend on the green film of vegetation mantling his earth.